

Application No. 10/691,466  
Amendment "A" dated June 3, 2005  
Reply to Office Action mailed February 3, 2005

### **REMARKS**

The present Amendment is in response to the Examiner's Office Action mailed February 3, 2005. Claim 7 is cancelled, claims 1-3, 6, 8, 9, 12, 20, 25, 29, and 30 are amended, and new claims 32 and 33 are added. Claims 1-6 and 8-33 are now pending in view of the above amendments.

Reconsideration of the application is respectfully requested in view of the above amendments to the claims and the following remarks. For the Examiner's convenience and reference, Applicant's remarks are presented in the order in which the corresponding issues were raised in the Office Action.

Please note that the following remarks are not intended to be an exhaustive enumeration of the distinctions between any cited references and the claimed invention. Rather, the distinctions identified and discussed below are presented solely by way of example to illustrate some of the differences between the claimed invention and the cited references. In addition, Applicants request that the Examiner carefully review any references discussed below to ensure that Applicants' understanding and discussion of the references, if any, is consistent with the Examiner's understanding.

#### **I. Claim Objections**

The Office Action objects to claim 5 on the grounds that the phrase "retroprisms" is confusing and indefinite. In response, Applicants respectfully traverse the assertion that the term "retroprisms" is confusing or indefinite. The term "retroprism" is well known to one of ordinary skill in the art. The structure, uses, and manufacture of retroprisms are also well known to one of ordinary skill in the art. Retroprisms (also referred to as "retro-reflectors") have three mutually perpendicular surfaces and a hypotenuse face. Figure 1 shown below illustrates a common retroprism structure that is well known in the art.

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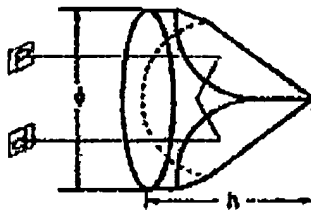


Figure 1. A Retroprism

Retroprisms operate on the principle of total internal reflection (TIR). A beam entering the effective aperture is reflected by three roof surfaces and emerges from the entrance/exit surface parallel to itself. This property is independent of orientation of the retroprism, within acceptance angle limitations. A retroprism reflects a signal with a result similar to a mirror, which is the other alternative referred to in the Markush group set forth in claim 5. A search for "retroprism" and "retro-reflector" within patent documents or elsewhere will provide additional description and detail if needed. Thus, the Applicant believes that the term "retroprism" is neither confusing nor indefinite and respectfully requests that the objection to claim 5 be withdrawn.

The Office Action objects to claim 12 on the grounds that the phrase "in an optical device a diffractive optical system" is confusing and indefinite. In response, Applicants have amended claim 12 to remove this language. Therefore, the Applicant believes that the objection is moot and respectfully requests that the objection to claim 12 be withdrawn.

The Office Action objects to claim 20 on the grounds that the alternative phrase is confusing and indefinite. In response, Applicants have deleted the alternative language and presented the alternative limitations separately in three different claims, namely claim 12 and newly added claims 32 and 33. Therefore, Applicant believes that claims 12, 32, and 33 are clear and definite and respectfully requests that the objection to claim 12 be withdrawn.

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## II. PRIOR ART REJECTIONS

### A. Rejection Under 35 U.S.C. §102(e)

The Office Action rejects claims 1-6 and 10-11 under 35 U.S.C. § 102(e) as being anticipated by *Chen et al.* (United States Patent No. 6,563,977). Because *Chen et al.* does not teach or suggest each and every element of the claims as currently presented, Applicants respectfully traverse this rejection in view of the following remarks.

*Chen et al.* is related to a wavelength multiplexer-demultiplexer providing low polarization sensitivity. *See* Title. Referring to Figure 1 of *Chen*, a device 2 is shown that includes an input/output array of optical fibers 4 each terminating in a fiber end for radiating and receiving associated light beams. *See* col. 7, lines 30-33. The device includes a reflective mirror 8 for reflecting beams radiating from the fiber ends, a lens 10 for collimating and focusing beams propagating between the fiber ends and the mirror 8, an angled transmissive grating assembly 12 for diffracting beams propagating between the lens 10 and the mirror 8, and a polarization rotating element 14 disposed between the grating assembly 12 and the mirror 8. *See* col. 7, lines 35-49.

Referring to Figure 4 of *Chen*, a multiplexer-demultiplexer device at 40 is shown that includes an array 42 of optical fibers 4, a single fiber 43, a transmissive grating assembly 44 having a diffractive element for diffracting beams propagating therethrough, a polarization rotating element 46, a first focusing and collimating lens 48, a second focusing and collimating lens 50, a first mirror 52 for reflecting beams radiating between the array 42 of fibers and the polarization rotating element 46 via the grating assembly 44, and a second mirror 54 for reflecting beams radiating between the single fiber 43 and the polarization rotating element 46 via the grating assembly 44. *See* col. 12, lines 22-55.

Referring to Figure 6 of *Chen*, a device 68 is shown that includes two identical or similar grating assemblies. The device 68 includes two lenses 48 and 50, first and second gratings 70 and 72, and a polarization rotating element 46 that are located in series between an array of fibers 42 and a single fiber 43 as shown. *See* col. 14, lines 29-41. *Chen* notes that this alternative

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embodiment provides the advantage of simplified optical alignment but adds one more grating and a longer mechanical path. See col. 14, lines 41-43.

In direct contrast to each embodiment disclosed by *Chen*, claim 1 as currently presented specifically recites:

1. A diffractive optics system, comprising:
  - a directing element that directs an inputted optical signal;
  - a first diffractive optical element;
  - a second diffractive optical element positioned at an angle with respect to the first diffractive optical element, wherein the first and second diffractive optical elements are configured to repeatedly transmit and diffract the directed optical signal into multiple channels of distinct wavelengths; and
  - a reflector that receives the multiple channels from the second diffractive optical element and reflects the multiple channels back toward the second diffractive optical element.

It is well established that to anticipate a claim, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989); see also MPEP 2131. *Chen* does not teach each and every element of independent claim 1. For example, neither Figure 1 nor Figure 4 of *Chen* teach a second diffractive optical element. Figure 6 does not teach a reflector. Similarly, none of the embodiments of *Chen* show an identical invention in as complete detail as that recited in claim 1. Since *Chen et al.* does not teach the system being claimed in independent claim 1, and as a result claims 2-6 and 10-11 at least due to their dependency on independent claim 1, Applicants respectfully request that the rejection under 35 U.S.C. § 102(e) be withdrawn.

**B. Rejection Under 35 U.S.C. § 103**

The Office Action rejects claims 7-9 and 12-20 under 35 U.S.C. § 103(a) as being unpatentable over *Chen et al.* (United States Patent No. 6,563,977). By this paper, the subject matter of claim 7 has been incorporated into independent claim 1, and claim 7 has been canceled. Applicants traverse the rejection for obviousness on the grounds that there is no motivation or suggestion in *Chen* to modify any of the multiplex/demultiplexing devices to use two diffractive optical elements and a reflector that receives the multiple channels from the second diffractive

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optical element and reflects the multiple channels (or twice diffracted optical signals) back toward the second diffractive optical element as set forth by both claim 1 and claim 12. In fact, the only suggestion for such is in the teachings by the Applicant. Thus, construction of such an embodiment can only be accomplished by impermissible hindsight.

The Office Action sets forth the rationale for providing the missing elements as "for the benefit of allowing the multiplex/demultiplexing device to have a folded geometric arrangement so that the device can be design to have a desired shape that fits to different application requirements." (Emphasis added). This rationale can only be found in the Applicant's teachings and not in *Chen*. In fact, *Chen* teaches away from the rationale relied upon in the Office Action stating that an embodiment having two gratings will result in a "longer mechanical path" (see col. 14, lines 41-43) which is quite different from a compact folded configuration as taught by the Applicant. Conclusory statements based on rationale found only in the Applicant's teachings cannot be relied upon for hindsight reconstruction of the Applicant's invention.

Independent claims 1 and 12 present a combination of elements to create a novel system. The Federal Circuit has long established that "[c]ombination claims can consist of new combinations of old elements . . . for it may be that the combination of the old elements is novel and patentable." *Clearstream Wastewater Sys. v. Hydro-Action, Inc.*, 206 F.3d 1440, 1444, 54 USPQ2d 1185, 1189 (Fed. Cir. 2000). The mere fact that it is possible to find two isolated disclosures within *Chen* with different combinations of elements that might be combined in some way to produce the invention does not necessarily render such production obvious unless *Chen* also contains something to suggest the desirability of the proposed combination. See *In re Bergel*, 130 USPQ 206, 208 (CCPA 1961). The teaching or suggestion to make the modification or combination of prior art and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *In re Vaack*, 947 F.2d 488 (Fed. Cir. 1991) (emphasis added).

In view of the lack of motivation to arrive at the system recited in claims 1 and 12, Applicants maintain that both claims 1 and 12 are allowable and respectfully request that any

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rejection under 35 U.S.C. § 103(a) of claims 1 and 12, and claims 8-9 and 12-20 at least due to their dependency on claims 1 and 12, be withdrawn.

The Examiner rejects claims 21-24 and 25-31 under 35 U.S.C. § 103 as being unpatentable over *Mitamura et al.* (United States Patent No. 6,646,805) in view of *Chen et al.* (United States Patent No. 6,563,977). *Mitamura* relates to an apparatus for variable wavelength dispersion and wavelength dispersion slope. *See Title*. The purpose of the *Mitamura* apparatus is for compensating for wavelength dispersion in a optical fiber that deteriorates the quality of a signal of a system. *See col. 1, lines 16-20; and col. 1, lines 48-55*. While *Mitamura* discloses several gratings and elements, *Mitamura* is not related to demultiplexing a multiplexed signal into wavelength distinct signals and transmitting the wavelength distinct signals to an array of optical fibers as discussed in further detail below. Similarly, *Mitamura* is not related to receiving wavelength distinct signals from a waveguide array, multiplexing the wavelength distinct signals into a single multiplexed signal, and transmitting the multiplexed signal to a single fiber optical waveguide.

For example, referring to Figure 32, *Mitamura* describes an apparatus with at least one diffraction grating pair 322 inserted between a lens 308 and a three-dimensional mirror 309. *See col. 22, lines 8-15*. A transmitting blazed grating having relatively large angular dispersion in an available wavelength band and having a high primary diffraction efficiency at a predetermined angle in an available wavelength band is used as the diffraction gratings 320 and 321. *See col. 22, lines 15-20*. The diffraction gratings 320 and 321 have a blaze angle and a refractive index appropriately selected such that the available wavelength band can substantially match the blaze wavelength, and rays travel in the same direction after passing through the diffraction grating pair 322. *See col. 22, lines 26-41*. If the rays travel in the direction vertical to the angular dispersion direction of the VIPA, the rays reflected by the three-dimensional mirror 309 return through the similar optical path. *See col. 22, lines 41-44*. Figures 33-43 disclose additional apparatuses for compensating for wavelength dispersion. Thus, as pointed out by the Office Action, *Mitamura* does not teach transmitting wavelength distinct optical signals to an array of waveguides.

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*Chen* is described above and relates to a wavelength multiplexer-demultiplexer providing low polarization sensitivity. *See* Title.

Claim 25 has been amended to more clearly point out at least one distinction between the present invention and the prior art. Independent claims 21 and 25 as currently presented set forth the following:

21. A method of demultiplexing an optical signal, comprising:  
directing a multiplexed optical signal along a predetermined path;  
performing a first diffraction of the multiplexed optical signal to separate the multiplexed optical signal into a plurality of channels having distinct wavelengths;  
performing a second diffraction to further disperse the plurality of channels;  
reflecting the plurality of channels after the second diffraction; and  
outputting the plurality of channels to a plurality of waveguides

25. A diffractive optics system capable of multiplexing and demultiplexing optical signals, comprising:  
a waveguide array including a plurality of fiber optic waveguides for carrying wavelength distinct optical signals;  
a lens assembly for directing optical signals;  
a first transmissive diffraction grating positioned in series with the lens assembly;  
a second transmissive diffraction grating positioned in series with the first transmissive diffraction grating;  
a reflector positioned in series with the second transmissive diffraction grating, the reflector enabling optical signals that have passed through the first and second transmissive diffraction gratings to be re-transmitted through the first and second transmissive diffraction gratings; and  
a single fiber optic waveguide for carrying a multiplexed optical signal.

A claimed invention is unpatentable for obviousness if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (1994); *Graham v. John Deere Co.*, 383 U.S. 1, 14 (1966); MPEP 2142. Obviousness is a legal question based on underlying factual determinations including: (1) the scope and content of the prior art,

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including what that prior art teaches explicitly and inherently; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. *Graham*, 383 U.S. at 17-18.

The first requirement is that a showing of a suggestion, teaching, or motivation to combine the prior art references is an "essential evidentiary component of an obviousness holding." *C.R. Bard, Inc. v. M3 Sys. Inc.*, 157 F.3d 1340, 1352 (Fed. Cir. 1998) (emphasis added). This evidence may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved. See *Pro Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996). However, the suggestion more often comes from the teachings of the pertinent references. See *In re Rouffet*, 149 F.3d 1350, 1359 (Fed. Cir. 1998). This showing must be clear and particular. Broad conclusory statements about the teaching of multiple references, standing alone, are not "evidence." See *Dembiczak*, 175 F.3d at 1000.

According to the Office Action, "[i]t would then have been obvious to apply the teaching of *Chen et al* to modify the arrangement of *Mitamura et al* to use waveguide array as means for efficiently inputting and outputting the optical signal." The Applicant respectfully traverses this modification of *Mitamura* because if one modified any of the apparatuses of *Mitamura* as suggested in the office action, *Mitamura* would no longer perform its purpose. The purpose of *Mitamura* is to compensate for dispersion. *Mitamura* compensates for dispersion by demultiplexing a signal into distinct wavelength signals into different paths, allowing the distinct wavelength signals to travel a distance, be reflected, travel an additional distance in return and multiplex the distinct signals into a single multiplexed signal. The single multiplexed signal is then transmitted to a single optical waveguide having dispersion in the multiplexed signal compensated for. Compensating for dispersion is the purpose of *Mitamura* and if the wavelength distinct signals were transmitted to an array of waveguides as suggested by the Office Action there would be no compensation for dispersion. Thus, this combination suggested in the Office Action in effect destroys the main purpose and teachings of *Mitamura*. The Applicant



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respectfully traverses the assertion that one would be motivated to modify a dispersion compensation apparatus so that it would no longer compensate for dispersion.

For at least these reasons the claims as currently presented are allowable over *Mitamura* in view of *Chen* and the Applicant respectfully requests that the rejection of claims 21-24 and 25-31 under 35 U.S.C. § 103(a) be withdrawn.

Claims 2, 3, 6, 8, 9, 29, and 30 are amended in this paper for consistency with the amendments made to the independent claims to which they depend.

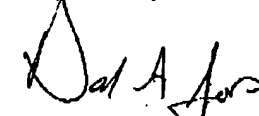
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### CONCLUSION

In view of the foregoing, Applicants believe the claims as currently presented are in allowable form. In the event that the Examiner finds remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview, or which may be overcome by an Examiner's Amendment, the Examiner is requested to contact the undersigned attorney.

Dated this 3rd day of June, 2005.

Respectfully submitted,



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